

STATE COLLEGE OF WASHINGTON
AGRICULTURAL EXPERIMENT STATION
Pullman, Washington

Division of Farm Management and Agricultural Economics
and The School of Business Administration

Cost of Wheat Production by Power Methods of Farming, 1919-1929

by
J. G. Klemgard and G. F. Cadisch



A typical wheat harvesting scene in the Palouse region of Eastern Washington.

Bulletin No. 255
June, 1931

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¹In cooperation with the State Committee on the Relation of Electricity to Agriculture.

²In cooperation with the United States Department of Agriculture.

PREFATORY NOTE

A record of wheat farming by one operator over a period of eleven years is presented in this bulletin for such guidance as it may give to the wheat producer in the Palouse country. It is not intended as a recommendation of any special system or method of farming, but rather is designed to show the actual costs and net income of one operator, using a system followed by many who are engaged in large scale wheat farming in this area.

The record is that of operations handled with more than average efficiency during a period of changing conditions and when the price received by the grower at the local marketing point averaged \$1.077 per bushel. The average profits for this period, though substantial, were very moderate. Although costs of production have been reduced materially and some further reduction possibly can be made, it is clear that costs must be below those here reported if the specialized wheat farmer, under economic conditions prevailing in 1931, is to have any return for his own labor or for the use of land.

COST OF WHEAT PRODUCTION BY POWER METHODS OF FARMING

1919-1929

By

J. G. Klemgard and G. F. Cadisch

INTRODUCTION

This bulletin gives the result of producing wheat under power methods of farming by one operator over a period of 11 years from 1919 to 1929 inclusive, in the Palouse region of the State of Washington. It describes the operations of a farmer who completely changed his motive power from horses to tractors in 1917, and who followed the alternating crop and summer fallow system and maintained no livestock. The records used date from 1919, as complete cost data for the two earlier years were not kept.

A description of the Palouse country is included to call attention to the topographical conditions that are generally conceded to be added factors of cost in wheat production.

The acreage farmed varied from 700 to 2400 acres per annum and was seldom located in a single tract. For a considerable portion of the 11 year period, these operations were conducted on from one to four tracts, depending on the year, within a radius of approximately 10 miles about Pullman. The base of these operations was a farm nine miles southwest of Pullman, where the operator lived. In 1929, in addition to the acreage near Pullman, one tract of 1400 acres was operated near Tekoa, Washington, about 50 miles from the base farm.

Most of the land was operated under lease contracts, regardless of location. The usual rental charge was one-third of the crop grown, delivered at the nearest country warehouse in sacks furnished by the tenant. The cancellation of leases and their sale or assignment caused wide variations in the amount of acreage farmed during the different years.

The summer-fallow system of crop production predominated. Winter wheat one year was followed with the land lying idle in fallow the following year. A wheat crop was produced every other year. No return was received from the land in summer fallow. The average yield per acre for the period 1919 to 1929 was 28.8 bushels per crop acre. The 1926-1929 average yield was 33.1 bushels. The average annual production was 21,831 bushels.

The equipment used varied during the period, but was always typical of the requirements of large scale wheat production in the Palouse area. Two tractors, one 60 H.P., and one 30 H.P., together with two harvesters, one of 18-ft. cut and one of 14-ft. cut, were the main units of equipment. The most recent list of equipment includes the four machines mentioned above, together with full tillage equipment, such as 20 bottoms of plows, 30 feet of discs, 40 feet of weeders, 32 feet of wheat drills, and six motor trucks of varying sizes and of popular makes. The trucks of one and one-half tons rated capacity are proving to be the most adaptable. The total original cost of all the machinery now on hand was \$26,600. The average annual investment in machinery and supplies maintained to operate the machinery throughout the period was \$13,730, while the average investment per farmed acre for each year was \$9.53. A complete repair shop, representing an investment of \$2,500 and equipped with repair stocks and maintenance tools, was erected at the base farm during the last half of the period because of the great need of such a shop on a power farm.¹

The average selling price per bushel from 1919 to 1929 was \$1.077. The average cost of production was 90.3 cents per bushel. The labor income, or the amount remaining to compensate the operator for his services, after all other deductions had been made, amounted to 17.4 cents per bushel for the period.* In determining the cost, no compensation for the services of the operator was allowed.

The records are influenced by the high prices and high costs following the war. The records are not comparable with 1931 since selling prices for wheat and its cost of production have undergone great changes during

¹This shop is described in Wash. Agr. Exp. Sta. Pop. Bul. 147, p. 10. The Farm Shop, Smith and Garver.

* Additional income to the operator was the use of the residence on one of the tracts, furnished by the landlord without rental charge other than that for the land, and the use of an automobile for other than business use. All automobile expenses except direct operating expenses when away from home on other than business trips were included with costs of farming operations.

1930 and 1931 as compared to the years covered in the records. The results reflect the costs of wheat production in a period when wheat sold for about \$1.00 per bushel. Some evidence of possible reductions in cost for the grower who is confronted with the present low prices of wheat (July, 1931) may be gained from the figures presented.

A summary of the various elements of cost in wheat production with power is followed with a discussion and explanation. Because some large fluctuations occurred in the cost of production from year to year, the influences found within the various periods are discussed. The possibilities of lowering costs concludes the work.

The selling price of wheat at Pullman in June, 1931, was about 40 cents per bushel. This figure, when compared with the cost of 90.3 cents per bushel as shown in records for the 11 years prior to 1930 points to the need of drastic readjustment in wheat production.

While this is the record of but a single operator, it covers an exceptionally long period of time as compared with any published records of operations of this size.

It is published at this time for such suggestions as it may contain for those who are raising wheat on large scale methods in the Palouse country. The study has been made by the School of Business Administration in cooperation with the Division of Farm Management and Agricultural Economics of the Agricultural Experiment Station.

SPECIAL CHARACTERISTICS OF THE PALOUSE REGION

The hillside farming of the Palouse country presents numerous features of interest and problems of difficulty.

The southeastern limit of the Palouse country is bounded by the snow-fed Clearwater river, which has its source in the Bitter Root Mountains of Idaho. From this portion of the region, extending east and north into Idaho about 20 miles, the natural border follows along the foothills westward, where the towns of Moscow, Idaho, and Palouse, Washington, set the approximate limits; and then north along the Idaho-Washington line to Tekoa, Washington. From Tekoa the boundary lies north and west, without definite markers but including the same type of well-watered country (in contrast to the semi-arid region westward belonging to the

Columbia River Basin), and finally southward, joining the steep bluffs of the Snake River, about 30 miles west of Lewiston, Idaho. This outline of the territory is the one most generally accepted.

A State College of Washington bulletin describes the area as follows:

The soil has drifted into its present rolling topography by wind action. It is very retentive of moisture . . . It compares favorably with . . . the rich silt loams of the Mississippi and the Red River valleys . . . The topography of the area is rolling.²

The average annual production of all wheat for the state of Washington for the years 1926 to 1929 was 48,223,000 bushels.³ The small area known as the Palouse Country contributes about one-third of the state's total production or about one-sixth of the total production of the three northwestern states of Oregon, Washington, and Idaho.

The average annual yield of wheat in these northwestern states is about 20 bushels per acre,⁴ but for the Palouse region it is, on the average, from 30 to 40 bushels per acre. Serious crop failures for the area have never been recorded.⁵

From the first entrance of settlers, the hilly nature of the terrain, the fertility of the soil, and the limited amount of rainfall and the time of its occurrence were factors which determined the selection of wheat as the leading crop. Other factors and problems in crop selection were those of storage and transportation. A crop with a high value commensurate with its bulk was also necessary. The farmers turned to wheat, since it conformed well with these requirements.

THE INTRODUCTION OF POWER FARMING MACHINERY INTO THE PALOUSE COUNTRY

The power farming history of the Palouse country in some respects parallels the general history of the development and use of power farming equipment. However, the difficulties encountered because of the topography of this section have caused Palouse farmers to operate at a disadvantage in using power equipment. (Fig. 1.)

²Severance, Geo., Hunter, Byron; and Eke, Paul. Farming Systems for Eastern Washington and Northern Idaho, Wash. Agr. Exp. Sta. Bul. 244, p. 10, 1930.

³United States Department of Agriculture Yearbook, 1930.

⁴Schafer, E. G., and Hegnauer, Leonard. Cereal Crops. State Col. of Wash. Ext. Ser. Bul. No. 134, p. 17.

⁵Inquiry among pioneers, i.e., Meyers, N. C., and Klemgard, J. S., Pullman, Wash.

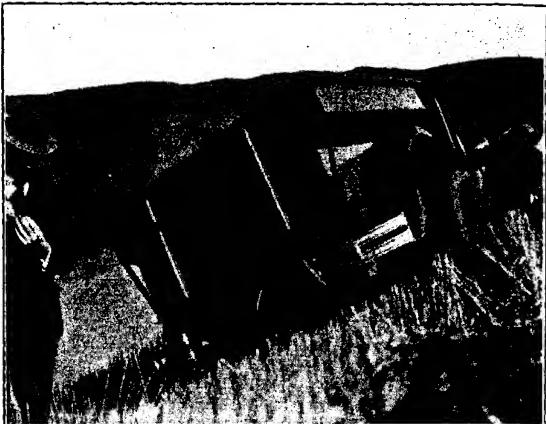


Fig. 1. Truck for handling bulk grain on a side hill of 45 per cent grade. These steep grades are responsible for high operating costs.

Predominantly the best tractor tested on the side hills in the early period of power development was the track-laying type. Some of the more venturesome farmers purchased these machines about 1915, and a few others followed their example under the incentive of war profits and a scarce labor supply in 1917. (Fig. 2.)

With the cessation of federally guaranteed wheat prices came the decline of 1921-22, when prices fell to about 50 per cent of former levels.⁶ Tractors were almost entirely abandoned, as the early types were too expensive to operate under the new price schedule for farm products.

The success obtained by a few users of power equipment who made purchases after 1922 had a distinct effect in changing the farmers' attitude toward power. In 1927, users of tractive power in wheat production on the hillsides demonstrated the practical use of more modern tractors under prices of wheat then prevailing. This directed attention to these successful installations. (Fig. 3.)

⁶ Anderson, Sydney. *The Agricultural Crisis and Its Causes*. House of Representatives, 67th Congress, 1st. Session, Report No. 408, Part I, October 15, 1921.



Fig. 2. A 60 H.P. tractor pulling nine 14-inch bottoms of plows, turning the soil to a depth of eight inches.

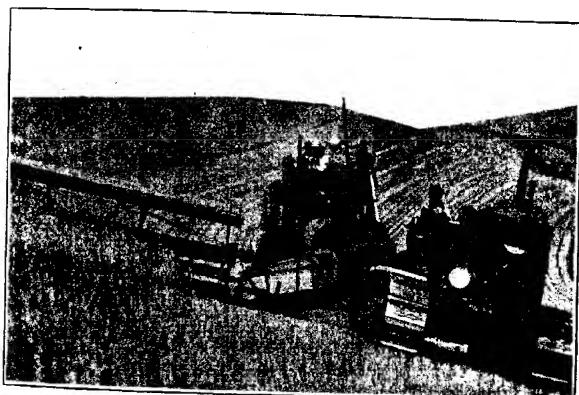


Fig. 3. Harvesting wheat with an eighteen foot combine and 60 H.P. tractor on the hills of the Palouse country near Pullman, Washington.

It is estimated that no less than 10 million dollars were spent in the Palouse country for farm automobiles, trucks, and tractors during the season, 1928-1929.⁷ Today, most farmers who have a considerable acreage and sufficient resources have purchased trucks, and combined harvesters, and tractors are much in evidence. According to one survey covering a limited area, tractors were reported as being found on about 20 per cent of the farms, and doing from 40 to 50 per cent of all farm work in the area during 1929-1930. Approximately 90 per cent of the wheat of the Palouse country is harvested with the combine.⁸ (Fig. 4)



Fig. 4. Bulk handling of wheat in the Palouse country near Tekoa, Washington. Farmers in the more level sections are adopting this method.

FACTORS CONTRIBUTING TO A RELATIVELY HIGH COST OF WHEAT PRODUCTION IN THE PALOUSE REGION

The operation of machinery upon the sidehills, where the grade is frequently 60%, is much more expensive than operations on the level. The track-laying type of tractor has been found to be the most successful, however, their initial cost and their upkeep is greater than for the wheeled type of tractor. The machinery is subjected to severe strain on account

⁷Inquiry among leading dealers and distributors.

⁸Estimate and survey by Pomona Grange of Whitman County, Washington, 1930.

of so much low gear pulling, and also on account of the necessity of crossing the numerous ditches that have eroded on the hillsides. These are some of the factors that have led to the higher production costs of producing wheat in the Palouse region by means of machinery.

While the added cost of hillside farming is generally admitted, there are few complete records of the cost of wheat growing on the hills in the Palouse country under power conditions. The Tekoa farm, which was acquired in 1929, is quite level and is almost the same size as the Pullman farm, which is very hilly. Comparative cost data are being assembled from the two farms. This data will show the difference in the cost of growing wheat on the level, and on the Palouse hills, on farms where similar methods are used and where similar yields are received. (Figs. 3 and 4.)

Users of power machines are inclined to be too optimistic at first regarding lower cost possibilities. No important repair bills are likely to be incurred during the first season or two, nor is depreciation given sufficient consideration by most farmers. As a result, power users are often misled as to production costs.

Custom truck haulers frequently make the same error, and apparently believe that freight can be hauled more cheaply than passenger cars can be operated. Consequently, farm crops are sometimes hauled under custom contracts at a rate lower than the farmers' own average hauling costs.

A RECORD OF COST OF PRODUCING WHEAT, 1919 TO 1929

The primary object of the accounting system maintained was to determine the cost of wheat growing per acre and per bushel; therefore, it was only necessary to group the costs under a few minor headings. A study of these major elements of cost has furnished information which has greatly assisted efficient management, and the accounts have been maintained at a minimum of effort. The accounts were not kept in such detail that the cost of the individual operations could be determined, although such a cost system has since been introduced on these farms.

Table 1 gives a summary of records obtained in producing wheat from 1919 to 1929 on a typical wheat operation with power methods of farming.

Table 1. Total Expenditures and Their Distribution in Producing
240,146 Bushels of Wheat on a Total of 8,350 Cropped Acres
under Power Methods of Farming, from 1919 to 1929 Inclusive¹

Cost items	Total expenditures	Cost per acre of crop produced	Cost per bushel	Average per cent of total cost
Rent	\$85,736.42	\$10.27	\$0.357	39.5
Labor ²	25,435.10	3.05	.106	11.7
Depreciation	22,825.93	2.73	.095	10.5
Gasoline and Oil ³	19,202.19	2.30	.080	8.9
Grain Bags	15,767.88	1.89	.066	7.3
Repairs	14,134.35	1.69	.059	6.5
Interest	12,945.12	1.55	.054	6.0
Seed	9,192.40	1.10	.038	4.2
Food	5,868.04	.70	.024	2.7
Taxes	3,161.46	.38	.013	1.5
Insurance	2,708.35	.33	.011	1.2
TOTAL	\$216,977.24	\$25.99	\$0.903	100.0

¹ Average annual yield per cropped acre was 28.8 bushels, while total average production per annum was 21,831.

² If \$1,000 per year be allowed for services of the operator, the total cost would be raised \$11,000, which is equivalent to 4.6 cents per bushel.

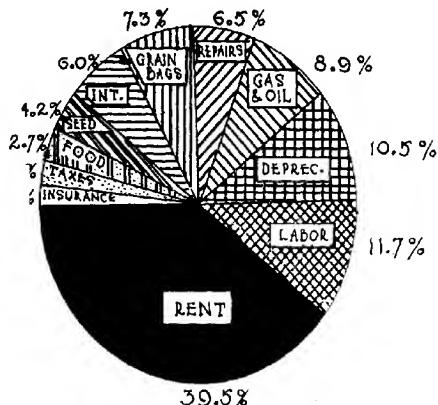
³ Gasoline constitutes 75 per cent of the costs.

Table 2 calls attention to fluctuating costs over the period of the record. Instead of using figures for individual years, two year averages were taken. This was done to eliminate errors in the cost data caused by any failure to have exactly half the farms in wheat and half in summer-fallow each year. Costs of preparing summer-fallow were charged against the crop harvested the same year, rather than the next crop, to which the cost of preparing summer-fallow really was assignable. The grouping of costs by two year periods eliminated all error caused by the amount of land in crop and in summer-fallow not being evenly balanced. But there still remains some error in the figures, by the two year periods, since the acreage of the farm was changed several times, thus having more or less land in summer-fallow at the end of a two year period than at the beginning. For that reason the figures for the full 11 year period are more accurate than are the figures by the two year periods.

Chart 1 shows the distribution of the cost elements in wheat production under power methods, from 1919 to 1929 inclusive.

DISTRIBUTION OF COST ELEMENTS IN WHEAT
PRODUCTION UNDER POWER METHODS
(1919-1929 Inclusive)

AVERAGE PER CENT TOTAL COST



COST PER BUSHEL

		\$0.357
LABOR		.106
DEPRECIATION		.095
GAS & OIL		.080
GRAIN BAGS		.066
REPAIRS		.059
INTEREST		.054
SEED		.038
FOOD		.024
TAXES		.013
INSURANCE		.011
TOTAL		\$0.903

Chart 1

Rent

Rent, or the cost of land, has been figured on a uniform basis. Whatever the form of land retention, whether it was ownership, lease by share, or a cash lease, the charge has been made on a basis of one-third of the crop paid to landlords, as nearly all wheat land renters in the Palouse country pay one-third of all their crops for rent of the land.

After 1925, nearby land similar to that operated sold from \$80 to \$100 per acre. In the earlier years of the record (1919-1924) land prices still reflected war time levels.

One-third of the wheat produced was set aside for the use of the land and valued at the same price per bushel that the operator received for his two-thirds any given year. The rent was computed as though the entire crop were sold and one-third of the proceeds tendered to the landlords.

Rent was the largest single item of cost, amounting to 39.5 per cent of all costs, or 35.7 cents per bushel, which is \$5.19 per farmed acre, or \$10.27 per crop acre, for the eleven year period. Total rent paid included a house for the operator, for which no adjustment has been made.

Labor

The labor account is charged with all labor actually paid for. It does not include any charge for the operator's labor and management. Two men were employed for about nine months each year. They have remained on the farm from three to five years. Ten additional men are employed from four to six weeks during the harvest rush season. These are transient but skilled men who frequently return from year to year. They work in the wheat belts during the harvest season and on industrial or construction jobs through the winter months, doing work of a similar mechanical character.

Labor is second in importance to rent as an element of cost, being 11.7 per cent of all costs. The cost of labor per bushel was 10.6 cents, or \$3.05 per acre of crop.

Depreciation

Depreciation on equipment has been charged at rates which varied from 10 to 15 per cent of the purchase price, depending on the type of machine. In determining depreciation rates for any year, obsolescence and

the usage of the machinery in comparison to the average usage were considered. The depreciation cost stands next to labor, and was 10.5 per cent of all costs, or 9.5 cents per bushel, or \$2.73 per acre cropped. Depreciation over the period was about one and one-half times the repair costs.

Combines do not depreciate as rapidly as tractors. (Fig. 5) The large-sized machine (18-ft. cut) was first used during the summer of 1923 and the 14-ft. cut machine in 1925. Each has an estimated life of ten years.

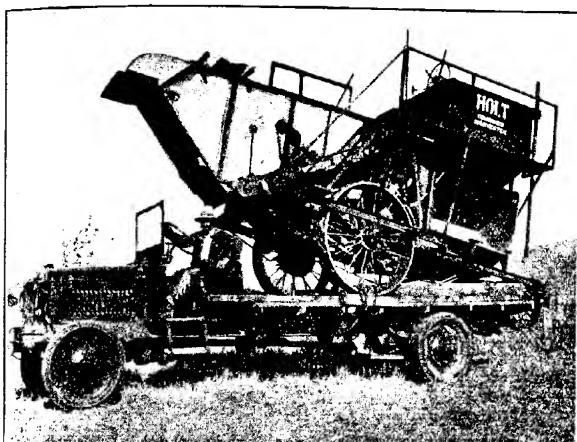


Fig. 5. Handling heavy equipment between farms in different locations by means of truck. Transfer of machinery is thus more quickly made, and the equipment is less likely to be damaged. State laws prohibit moving machinery with cleated wheels over the highways.

Gasoline and Oil

Gasoline and oil cost less than depreciation, being 8.9 per cent of all costs, which is equivalent to \$2.30 per crop acre or 8 cents per bushel. Favorable gasoline and oil prices were usually secured. Since approximately 75 per cent of the gasoline and oil cost was for gasoline, 86 cents per farmed acre was the cost of gasoline. The average price was 18 cents per gallon, and it required about 5 gallons per farmed acre or 10 gallons per crop acre. All gasoline consumption connected with farm work is included in this item.

Grain Bags

Grain bags constituted a relatively high charge, being 7.3 per cent of all cost. The price was high over the period, and the yields were large, requiring a large number of sacks. Bags were furnished for the landlord's third of the crop. The sack method of handling predominates in this area, because rather inadequate bulk equipment is available for this hilly topography. Also there are few country elevators and the terminals lack sufficient bulk storage capacity. (Figs. 3, 4, and 6.)



Fig. 6. Elevating grain sacks by motor equipment in order to save labor and speed the work. After being dropped by the combine, the sacks are gathered at convenient stations for this loading operation.

Beginning in 1929, however, one-half of the production from the farms discussed in this record was handled in bulk, which reduced the amount paid for bags about one-half for that year. The entire wheat crop will be handled in bulk in 1931.

Repairs

The repair charges consist of the purchase of all parts and supplies for tractors, combines, and trucks, other than gasoline and oil. They include stocks of parts on hand for present and future use, replacements, upkeep of minor tools, and upkeep on special servicing equipment, such

as valve grinding machines, acetylene welding equipment, and repairs to fences and buildings. The repair cost per acre of crop was \$1.69, or 5.9 cents per bushel, which was 6.5 per cent of all costs.

Interest

Interest at six per cent was allowed on the capital invested in the operating equipment. This was exclusive of interest on buildings and fences, which were the property of the landlords. The interest charge also includes the amount paid for working capital which was nearly all borrowed for short periods from banks at 8 per cent interest. Interest consumed 6.0 per cent of all cost, i.e., \$1.55 per acre of crop, or 5.4 cents per bushel. Since cash was paid for the operating equipment, the usual higher interest and installment charges which are paid when equipment is purchased on a time basis were avoided.

Seed

Seed is included as an item of cost, whether purchased or produced on the farm. When seed was purchased, it was charged at cost. Where only part was purchased and part retained from production for seed usage, the part retained was charged at the average price received for the balance of the crop. Consequently, it was necessary to add a similar amount to the sales of wheat as an offset. Seed took 4.2 per cent of all costs, which was \$1.10 per acre of crop, or 3.8 cents per bushel.

Food

Food purchased comprised 2.7 per cent of the total cost. This was for food supplied to hired help and may be considered an addition to the labor cost. It did not include food for the family and operator. A small garden, fruit trees, poultry, and a few farm animals contributed to the family food supply and were a source of some additional income to the operator. Board in the home of the operator was only rarely supplied to hired help, and when this was done additional household help was hired, and the cost of this help included in the cost of labor.

Taxes

One and one-half per cent of the total cost was paid for taxes directly, and amounted to 38 cents per acre of crop, or 1.3 cents per bushel. This does not include *real property taxes*, which are included in the rental cost

and paid by the landlord. The taxes were personal property taxes on the equipment and truck and automobile license fees.

Insurance

Insurance covers risk of fire on crop, machinery, and buildings, and employer's liability insurance. Public property damage and personal liability insurance was carried on the truck and automobile equipment and are included. Insurance was 1.2 per cent of all costs; or 33 cents per crop acre; or 1.1 cents per bushel.

Summary

To summarize these costs for the 11 year period, the cost items in per cent of all cost were in the following order, namely: rent, 39.5; labor, 11.7; depreciation, 10.5; gasoline and oil, 8.9; grain bags, 7.3; repairs, 6.5; interest, 6.0; seed, 4.2; food, 2.7; taxes, 1.5; and insurance, 1.2.

On a cost per bushel basis, the rent amounted to 35.7 cents; labor, 10.6 cents; depreciation, 9.5 cents; gasoline and oil, 8 cents; grain bags, 6.6 cents; repairs, 5.9 cents; interest, 5.4 cents; seed, 3.8 cents; food, 2.4 cents; taxes, 1.3 cents; and insurance, 1.1 cents.

On a per acre basis of the farm in crop, the costs were as follows: rent, \$10.27; labor, \$3.05; depreciation, \$2.73; gasoline and oil, \$2.30; grain bags, \$1.89; repairs, \$1.69; interest, \$1.55; seed, \$1.10; food for employees, 70 cents; taxes, 38 cents; and insurance, 33 cents.

DISTRIBUTION OF COST PER BUSHEL OF PRODUCING WHEAT UNDER POWER METHODS

Given in two year periods (except 1927) from 1919-1929 incl.

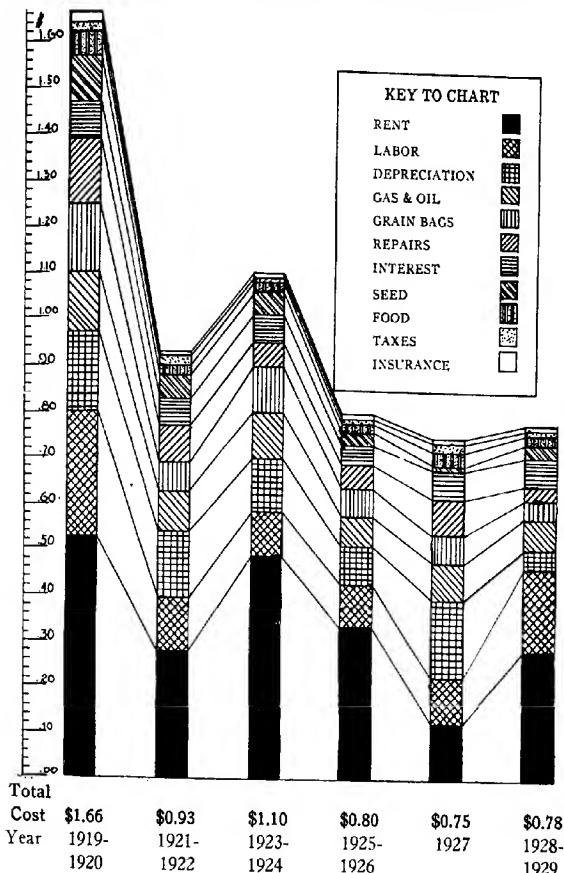


Chart 2

Chart 2 shows the distribution of cost per bushel of producing wheat under power methods. The cost is given in two year periods (except 1927) from 1919 to 1929 inclusive.

Table 2. Distribution of Cost per Bushel of Producing Wheat under Power Methods

Given in two year periods (except 1927) from 1919 to 1929 inclusive.

Item	1919 1920	1921 1922	1923 1924	1925 1926	1927 Only	1928 1929
Rent	\$.53	\$.28	\$.49	\$.34	\$.13	\$.39
Labor	.27	.12	.10	.09	.10	.08
Depreciation	.17	.14	.11	.08	.17	.04
Gasoline and Oil	.13	.09	.10	.07	.08	.07
Grain Bags	.15	.06	.10	.06	.06	.04
Repairs	.14	.08	.05	.05	.08	.03
Interest	.08	.06	.06	.04	.06	.06
Seed	.10	.05	.05	.03	.01	.03
Food	.05	.02	.02	.02	.03	.02
Taxes	.02	.02	.01	.01	.02	.01
Insurance	.02	.01	.01	.01	.01	.01
Total Cost	\$1.66	\$.93	\$1.10	\$.80	\$.75	\$.78
Selling price	\$1.90	\$.86	\$1.12	\$1.03	\$1.03	\$.92
Average acres in crop each year of period	450	650	600	1200	850	850
Bushels produced per year	8,192	11,962	16,502	42,732	25,619	27,876

1919-1920

The cost per bushel in this two year period was \$1.66, the highest of all two year groups. Labor cost per bushel was more than double the average for the 11 year period. The cost of grain bags was the highest of any similar period. The high cost reflects the immediate post war conditions and the relatively low production of only 8,192 bushels each year or 18.2 bushels per acre on 450 acres in crop each year. Since the selling price averaged \$1.90 per bushel, the profit was 24 cents per bushel.

1921-1922

It was in this period that wheat prices collapsed. Stringent economies practiced during this depressed period account for much of the lower costs during these two years. Lower prices for grain bags and gasoline were factors in furthering cost reductions. The cost per bushel was 93 cents and the selling price 86 cents. The yield was still low and averaged 18.4 bushels per acre of crop. The total production averaged 11,962 bushels per year on 650 acres in wheat each year.

1923-1924

The two year annual average yield for this period was 16,502 bushels on 600 acres in crop each year, or an average annual production of 27.5 bushels. Rent consumed about 45 per cent of all charges, or 49 cents per bushel. The other charges per bushel approximate those of the periods just preceding and following. The total cost was \$1.10 per bushel and the selling price \$1.12. The margin of profit was but 2 cents per bushel.

1925-1926

The cost in this period dropped to the 80 cent level for the first time since the war. The selling price was \$1.03 per bushel, which netted a profit of 23 cents per bushel. The size of the farm was doubled, which made it possible to do some of the work more efficiently. A high yield of 35.6 bushels per acre had a large effect on costs per bushel. The labor per bushel was slightly less than for the previous periods. Grain bags were low in price. Depreciation and repairs per bushel were lower because the machines were more fully utilized on the larger farm acreage. The total production per annum averaged 42,732 bushels. The average acreage each year in crop was 1,200.

1927

A disorganization occurred during 1927 because a portion of the leases were sold and others which could not be renewed were terminated. An estimate was made of the probable yield and selling price for the growing winter wheat crop sold with the lease and an adjustment made in the total production for the year.

Since little use was found on the reduced acreage for the large oversupply of machinery, some of it was sold and the balance overhauled. This caused a disproportionate depreciation and repair charge.

The calculated cost was 75 cents per bushel, the calculated selling price \$1.03, and the calculated area in crop was 850 acres. The equivalent of 25,619 bushels was produced. The year was not representative, and no conclusions should be drawn from it as being typical of a complete annual operation similar to other two year periods.

1928-1929

The years of 1928-1929 probably represent the most normal conditions for the entire period under consideration. The experience which had been accumulated was applied to the management of the farm and resulted in economies in production. No unusual event developed. The selling price was 92 cents per bushel, while the cost of production was 78 cents. Most of the cost items, except rent, tended to be lower than in the previous two year groups. The yield was 27,876 bushels each year, which averaged 32.8 bushels per acre of crop on 850 acres in wheat.

The 1928-1929 figures represent a fair cost figure for wheat production, which cost figure prevailed just prior to the steady downward trend of sale prices for wheat in the latter part of 1930.

Strenuous efforts have been made since then to introduce new economies as rapidly as the new low price levels have appeared. Only partial success has been obtained in this regard.

Profits

The cost of producing wheat for the 11 year period without allowing wages to the operator was \$0.903 per bushel. The average selling price was \$1.077 per bushel. This left a profit of \$0.174 per bushel. The total production was 240,146 bushels and the total net income was \$41,758 for the period, or an average yearly return of \$3,796 for raising wheat.

This return, \$3,796, is exclusive of 6 per cent allowed on the capital invested by the operator, and the annual average net income of \$890 secured from the outside operations of farm equipment in custom work.* Separate cost accounts, distinct from the wheat production accounts, were kept for this custom work. In addition to the above, the operator had the use of his residence, which was supplied by the landlord without additional rent, and the use of his automobile on personal trips away from the farm with only the direct operating costs charged to his personal account.

* Custom work refers to work done for others.

For the first two years, 1919-1920, the profit was 24 cents per bushel. The selling price was \$1.90 per bushel, while the cost was \$1.66 per bushel. In the following two year period, which were the depression years 1921-1922, a loss of 7 cents per bushel was incurred. Only 2 cents per bushel was made in 1923-1924. Profits for 1925-1926 averaged 23 cents per bushel. Sales prices approximated those of the previous two year period, while the cost was cut to 80 cents per bushel. The reduction in cost was due largely to an increase in production of 8.1 bushels per acre, and the area farmed was twice as large as that of the previous two year period. Operations during 1927 showed a profit of 28 cents per bushel, but the year was not typical of normal wheat production. The last period, 1928-1929, shows a profit of 14 cents per bushel, which is somewhat below the average of 17.4 cents for the 11 year period.

Most of the wheat was sold in June or July each year just prior to harvest. This resulted in savings in interest, storage, and insurance, which expense would have accrued if the wheat had been held for sale at a later date.

POSSIBILITIES FOR LOWERING PRODUCTION COSTS IN THE PALOUSE REGION

In concluding this discussion of the cost of wheat production for the period 1919-1929 under power methods of farming, it appears advisable in view of the low prices in 1931 to discuss some of the possibilities for lowering production costs in the future.

1. Recent cuts in wages and supplies such as gasoline and oil will result in lower costs per bushel. The present (1931) wage scale for farm help is approximately one-third lower than 1929. Gasoline and oil prices have fallen at Pullman to the lowest point they have reached in the period since the war. Other supply prices have also moved slightly downward.

2. Depreciation of farm machinery may be reduced, and its life lengthened, by proper repair work. Machines which are capable of rendering much additional service are often prematurely discarded. Because of the lower profits of late years, fewer machines are being discarded. The operation of old machines, even though less efficient than new, may be

cheaper than making the necessary capital outlay for new machinery. This is particularly true when handling low priced wheat.

3. If the conditions permit, handling grain in bulk is cheaper than handling in sacks. The bulk method eliminates the need of a sack crew on the harvester for handling grain, and sacks are not required, which also results in a saving. However, in bulk harvesting, delays may be introduced and a thorough investigation should be made before deciding to change to this method.

4. Custom work may sometimes utilize the machine equipment throughout a larger part of the year. This has been an additional source of revenue for some farmers in the past. The opportunities for this work are diminishing in the Palouse country, but it should be sought by the farmer who is over-equipped with machinery.

5. Large scale production permits large purchases of supplies, a considerable proportion of which can usually be secured at wholesale prices. It is usually not possible for the average wheat grower to expand his acreage at will, but those who can take advantage of the economies of large-scale farming might well increase the size of their farms.

6. Permanent improvements and capital outlays should be kept at a minimum. Such improvements can be reduced in many cases without immediate serious results.

7. In some instances where fire insurance rates are high in proportion to the risk involved, it may be advisable for the wheat grower to carry all or part of his insurance risk.

8. All farm machinery should be kept in repair so that advantage may be taken of any favorable time to do farm work if the best results are to be had with a given outlay of labor and capital. The ground should be tilled when it contains the proper amount of moisture because a minimum of effort will then be required.

9. In times of low prices the need for capital is somewhat less than in periods of high prices, and some savings can be made in lower interest charges. Purchasing for cash or borrowing funds from banks is usually cheaper than time or installment credit.

